

SUMMARY OF MAJOR CHANGES TO THE DOD 6055.9-STD REWRITE VERSION

Revision 5, 1 June 2004:

1. Revised all pages to reflect Rev 5, 1 June 2004.
2. Foreword: Changed A&T (2 places) to AT&L.
3. Abbreviations & Acronyms: Added;
 - a. NATO – North Atlantic Treaty Organization.
 - b. RORO – Roll-on or Roll-off.
4. Chapter 1, C1.4.5: Changed A&T to AT&L.
5. Chapter 3, C3.2.1.2.3: Changed “or” (2 places) to “and” to reflect correct hazard classification procedures.
6. Chapter 5, Table C5.T1, “Maximum Height Above Top of Stack” column: During the DoD 6055.9-STD Re-write effort, the distances were inadvertently repeated from the adjacent column. Correct distances have been inserted.
7. Chapter 9:
 - a. C9.4.1.2.1.1.2.1: Callout to C9.T3 changed to correct callout of C9.T1.
 - b. C9.T1, Note 3, EQN C9.T1-24: Equation distance applicability range revised to “1,160 ft < d ≤ 3,150 ft”.
 - c. C9.T2: 5 and 7-lb “OPEN” distances respectively changed to “419 127.7” and “445 135.6”.
 - d. Table C9.T6, intersection of “Modules and/or Cells, B” and “Modules and/or Cells, UB”: K-factor of “6 2.38” revised to “1.1⁸ 0.44⁸”.
 - e. C9.4.2.14, last sentence: Callout to C9.T11 revised to correct callout C9.T8.
 - f. Table C9.T13, IBD & PTR column: Aboveground removed. It was inadvertently added during the DoD 6055.9-STD Rewrite effort and was causing confusion.
 - g. Table C9.T13, General Comment (b): Added “Use IBD & PTRD column of Table C9.T13 for determining the IBD and PTRD associated with the HD 1.3 being placed in such ECM.” after last sentence in order to clarify existing criteria.
 - h. C9.5.5.3: Changed incorrect callouts to C9.T17 and C9.T18 respectively to C9.T16 and C9.T17.
 - i. C9.T24, Note 10: Changed incorrect callout to Note 7 to Note 6.
 - j. Added C9.6.2.1.2.3 as approved by 326th DDESB:

“C9.6.2.1.2.3. Roll-on or roll-off AE operations involving ships where the requirements of C9.8.12 are met.”
 - k. Renumbered C9.6.3.3.5 through C.6.3.3.9.4. to C9.6.3.4 through C9.6.3.8.4. Structure of these paragraphs was inadvertently changed during the DoD 6055.9-STD Rewrite effort.
 - l. C9.7.1.3: Changed incorrect callout to C9.7.2 to C9.7.1.2.
 - m. C9.T31, Note 1: added “<” between 0.25 ft/lb^{1/3} “ and “C”.
 - n. C9.7.2.3.3.1.1: Revised incorrect callout to Note 3 to Note 4.
 - o. C9.7.2.3.3.2.1, definition for D_{HYD}: deleted symbol “π” from D=4πA/P. Symbol inadvertently added during the DoD 6055.9-STD Rewrite effort.

- p. C9.T36, entry for 5"/54 projectile: 1800 **548.6** changed to 2307 **703.2** based on input from Dr. Michelle Crull, who informed the DDESB via e-mail of 21 May 2004 to Mr. Deschambault that an error had been found in the calculation for the 5"/54 and that the existing Maximum Fragment Throw Distance of 1800 feet was incorrect.
- q. C9.8.12.1 revised as approved by 326th Board.

"C9.8.112.1. Roll-on or roll-off (RORO) operations (not involving lifting), which meet the following requirements:

C9.8.12.1.1. The total NEWQD present shall not exceed 50,000 lbs.

C9.8.12.1.2. All AE present (e.g., in trailers, railcars, barges, ships) must be associated only with the RORO operation being conducted.

C9.8.12.1.3. RORO operations shall not exceed 24 hours following arrival of AE, including AE staged at a transshipment point.

C9.8.12.1.4. RORO operations shall be located as remote as practicable from populated areas, in order to minimize exposure of unrelated personnel."

- r. New C9.8.20 added, as approved by 326th DDESB:

C9.8.20. Conveyance loading and unloading at a Magazine. *A conveyance (e.g., truck, trailer, railcar, ISO or MILVAN container) loading and unloading operation is permitted at a magazine without regard to QD between the magazine and the operation. "At a magazine" means loading and unloading operations at a loading dock attached to the magazine, or on the pad/apron in front of the magazine, or within the established boundaries of an aboveground magazine. Detached ramps or loading docks that normally service multiple facilities will be sited in accordance with C9.8.8.*

8. Chapter 10:

- a. NEQ replaced with NEWQD throughout in order to be consistent with Chapter 9.
- b. Columns D4 and D5 revised to reflect the need for minimum distances for NEWQD up to 5,500 lbs. These minimum distances were inadvertently deleted during the DoD 6055.9-STD Rewrite effort.
- c. Notes 4, 5, and 6 were revised as shown below to reflect the minimum distances applicable to them (591 feet for D4, 886 feet for D5, and 66 feet for D6).

4. D4 is used for PTRD from non-armored and light armored vehicles.

Determining D4 and NEWQD for D4 (NEWQD in lbs, D4 in ft):

NEWQD ≤ 5,500 lbs

D4 = 591 ft.

5,500 lbs < NEWQD ≤ 8818 lbs

D4 = 8*NEWQD^{1/2}

[EQN C10.T1-13]

D4 < 591 ft

NEWQD = 0 lbs

591 ft ≤ D4 ≤ 751 ft

NEWQD = (D4/8)² (8,818 lbs maximum)

[EQN C10.T1-14]

Determining D4 and NEWQD for D4 (NEWQD in kg, D4 in m)

$NEWQD \leq 2,495 \text{ kg}$	$D4 = 180 \text{ m}$	
$2,495 \text{ kg} < NEWQD \leq 4000 \text{ KG}$	$D4 = 3.62 * NEWQD^{1/2}$	[EQN C10.T1-15]
$D4 < 180 \text{ m}$	$NEWQD = 0 \text{ kg}$	
$180 \text{ m} \leq D4 \leq 229 \text{ m}$	$NEWQD = (D4/3.62)^2$ (4,000 kg maximum)	[EQN C10.T1-16]

5. D5 is the IBD from non-armored and light armored vehicles.

Determining D5 and NEWQD for D5 (NEWQD in lbs, D5 in ft):

$NEWQD \leq 5,500 \text{ lbs}$	$D5 = 886 \text{ ft.}$	
$5,500 \text{ lbs} < NEWQD \leq 8818 \text{ lbs}$	$D5 = 12.2 * NEWQD^{1/2}$	[EQN C10.T1-17]
$D5 < 886 \text{ ft}$	$NEWQD = 0 \text{ lbs}$	
$886 \text{ ft} \leq D5 \leq 1146 \text{ ft}$	$NEWQD = (D5/12.2)^2$ (8,818 lbs maximum)	[EQN C10.T1-18]

Determining D5 and NEWQD for D5 (NEWQD in kg, D5 in m)

$NEWQD \leq 2,495 \text{ kg}$	$D5 = 270 \text{ m}$	
$2,495 \text{ kg} < NEWQD \leq 4000 \text{ KG}$	$D5 = 5.43 * NEWQD^{1/2}$	[EQN C10.T1-19]
$D5 < 270 \text{ m}$	$NEWQD = 0 \text{ kg}$	
$270 \text{ m} \leq D5 \leq 343.4 \text{ m}$	$NEWQD = (D5/5.43)^2$ (4,000 kg maximum)	[EQN C10.T1-20]

6. D6 is used to determine the IBD and PTRD from heavy armor vehicles. When NEWQD exceeds 331 lb (150 kg) the IBD and PTRD specified in C9 apply.

Determining D6 and NEWQD for D6 (NEWQD in lbs, D6 in ft):

$NEWQD \leq 110 \text{ lbs}$	$D6 = 66 \text{ ft}$	
$110 \text{ lbs} < NEWQD \leq 331 \text{ lbs}$	$D6 = -4.49 + 0.487 * (NEWQD^{1/3}) + 2.928 * (NEWQD^{1/3})^2$	[EQN C10.T1-21]
$D6 < 66 \text{ ft}$	$NEWQD = 0 \text{ lbs}$	
$66 \text{ ft} \leq D6 \leq 138 \text{ ft}$	$NEWQD = (0.0833 + [1.5421 + 0.3416 * D6]^{1/2})^3$	[EQN C10.T1-22]

Determining D6 and NEWQD for D6 (NEWQD in kg, D6 in m)

$NEWQD < 50 \text{ kg}$	$D6 = 20 \text{ m}$	
$50 \leq NEWQD \leq 150 \text{ kg}$	$D6 = -1.37 + 0.193 * (NEWQD^{1/3}) + 1.512 * (NEWQD^{1/3})^2$	[EQN C10.T1-23]
$D4 < 20 \text{ m}$	$NEWQD = 0 \text{ kg}$	
$20 \text{ m} \leq NEWQD \leq 42.3 \text{ m}$	$NEWQD = (0.0640 + [0.9108 + 0.6615 * D6]^{1/2})^3$	[EQN C10.T1-24]

- d. An error in EQN C10.T1-2 was corrected. Correct equation is $NEWQD = (D1/2)^3$.
- e. C9.T2: During the DoD 6055.9-STD Rewrite effort, a couple of “D” callouts were inadvertently inverted. From a Light Vehicle to a Non-Armored Vehicle, D3 should have been specified and not D1. From a Non-Armored Vehicle to a Light Vehicle, D1 should have been specified and not D3.
- f. C10.T3: Added Note 3 to “IBD” callouts at the intersection of From PES - Captured Enemy Ammunition, to ES Manned Non-explosives Support Facility. The note callout was inadvertently left off during the DoD 6055.9-STD Rewrite effort.
- g. Added new C10.4.9, as approved by the 32th DDESB:

C10.4.9. Roll-on or Roll-off AE Operations. A documented risk assessment, (e.g., Safety Assessment for Explosives Risk (SAFER)), must be used when C9 criteria cannot be met. The risk assessments, performed and accepted in accordance with DoD Component criteria, must consider explosive effects, explosives limits, site location, operation scheduling, potential

secondary hazards (e.g., fuel tanks, chemical), and surrounding personnel and exposures. Risk reduction or mitigation measures, identified from the risk assessment, must be incorporated into the RORO operational procedures.

9. Chapter 13, C13.1.3: Changed (Force Protection) (ADUSD(FP)) to (Environment, Safety & Occupational Health) (ADUSD(ESOH)).
10. AP1: Added new definition for Roll-on or Roll-off, as approved by the 326th DDESB.

Roll-on or Roll-off (RORO). *An AE operation that involves the movement, without lifting, of AE-laden semi-trailers, railcars, or similar wheeled conveyances into or from a transporter (e.g., a barge, a ship, a railcar or aircraft), such that the conveyances remain in a transportation mode through a transshipment point.*

11. AP2: Revised Equations C10.T1-1 through C10.T1-24 to reflect “NEWQD” vice “NEQ” and to correct the error discussed in 8.d above.

Revision 4, 5 January 2004:

1. Revised all pages to reflect Rev 4, 5 Jan 2004.
2. Added C6.6 to "Table of Contents" to address a new section - Hazards of Electromagnetic Radiation to Ordnance (HERO) - as approved by the DDESB via correspondence (DDESB-KT Memorandum of 25 Sep 2003).
3. Added the following new acronyms, as approved by the DDESB via correspondence (DDESB-KT Memorandum of 25 Sep 2003):

- E3	electromagnetic environmental effects
- EID	electrically initiated device
- EMCON	emission control
- EME	electromagnetic environment
- EMR	electromagnetic radiation
- HERO	hazards of electromagnetic radiation to ordnance

4. Added the following new references, as approved by DDESB via correspondence (DDESB-KT Memorandum of 25 Sep 2003):

- (an) MIL-HDBK-240, Hazards of Electromagnetic Radiation to Ordnance (HERO) Test Guide
- (ao) MIL-HDBK-237, Electromagnetic Environmental Effects on Platforms, Systems, and Equipment
- (ap) JP 1-02, DoD Dictionary

5. Added "C6.6. Hazards of Electromagnetic Radiation to Ordnance (HERO)", as approved by the DDESB via correspondence (DDESB-KT Memorandum of 25 Sep 2003).
6. C9.4.1.2.1.1.3 (2 places): Revised incorrect callouts to Table C9.T3 to correct Table C9.T1.
7. Table C9.T1: Revised second sentence of Note 4 to reflect that lesser distances may be permitted for certain situations (see C9.4.1.2.1.1).

8. C9.4.1.2.1.1.3.1: Revised incorrect callout to Table C9.T3 to correct Table C9.T1.
9. Revised C9.4.2.11 and deleted C9.4.2.11.1 and C9.4.2.11.2. These paragraphs did not reflect C3.2.1.2.3.
10. C9.4.4.3: Replaced callout to non-existent C3.5.1.13 with correct callout to C2.5.5.
11. Table C9.T13, 1,500,000 NEWQD: Replaced incorrect table entries "936 [285.3]" and "577 [175.8]" with correct table entries "916 [279.2]" and "572 [174.3]".
12. Table C9.T4, Barricaded Front column for 500,000 lbs: Changed "716" feet to "715" feet, to match Note 1 information.
13. Table C9.T4, Notes 1 through 6: Revised the boundaries (i.e., \leq and \geq), as shown below to ensure all NEWQD and "d" of interest are considered. As currently defined, certain "NEWQD" and "d" are not considered.

1. 300,000 lbs < NEWQD \leq 500,000 lbs
669 ft < d \leq 715

136,077 kg < NEWQD \leq 226,795 kg
204.2 m < d \leq 218.0 m

2. 469 ft < d \leq 663 ft

143.7 m < d \leq 202.8 m

3. 300,000 lbs < NEWQD \leq 400,000 lbs
402 ft < d \leq 665 ft

136,077 kg < NEWQD \leq 181,436 kg
122.6 m < d \leq 202.8 m

4. NEWQD \leq 500,000 lbs

NEWQD \leq 226,795 kg

5. 1071 ft < d \leq 1328 ft -----

122.6 m < d \leq 202.8 m

6. 557 ft < d \leq 938 ft -----
938 ft < d \leq 1328 ft

169.8 m < d \leq 285.7 m
285.7 m < d \leq 404.7 m

14. Table C9.T13: Corrected EQN C9.T13-7, -8, -10, -11, -19, -20, -22, and -23, which contained errors.
15. C9.8.3: Changed incorrect callout to C9.2.2.1 to correct callout C2.2.1.3.
16. C11.1.1.1 and C11.1.1.2: Added "(examples include, but are not limited to)" after Blister Agents and Nerve Agents to reflect the listing of agents in Table 4 and paragraph 4.3 of DDESB TP10. The current wording appears to be all-inclusive, which it is not.
17. AP.1, Glossary: Added the following definitions, as approved by the DDESB via correspondence (DDESB-KT Memorandum of 25 Sep 2003).

Hazards of Electromagnetic Radiation to Ordnance (HERO) - Situations in which transmitting equipment (for example, radios, radar, electronic countermeasures, electronic counter-countermeasures, ground penetrating radar, etc.) or other electromagnetic emitting devices can generate radiation of sufficient magnitude to: induce or otherwise couple electromagnetic energy sufficient to exceed specified safety and/or reliability margins in electrically initiated devices (EID) contained within ordnance, or cause radiation-induced

damage or degradation of performance in military munitions containing EID. (MIL-HDBK-240)

Electro-Explosive Device (EED) - An explosive or pyrotechnic component that initiates an explosive, burning, electrical, or mechanical train and is activated by the application of electrical energy. (JP 1-02, DoD Dictionary)

Electrically Initiated Device (EID) - An EID is a single unit, device, or subassembly that uses electrical energy to produce an explosive, pyrotechnic, thermal, or mechanical output. Examples include: electro explosive devices (such as hot bridge wire, semiconductor bridge, carbon bridge, and conductive composition), exploding foil initiators, laser initiators, burn wires, and fusible links. (MIL-HDBK-240)

Electromagnetic Environment (EME) - The EME is the resulting product of the power and time distribution, within various frequency ranges, and includes the radiated and conducted electromagnetic emission levels that may be encountered. It is the totality of electromagnetic energy, from man made and natural sources, to which a platform/system, or subsystem/equipment will be exposed within any domain, that is, land, air, space, and sea, while performing its intended mission throughout its operational life cycle (in the case of munitions, during its stockpile-to-safe separation sequence). When defined, the EME will be for a particular time and place. Specific equipment characteristics, such as operating frequencies, emitter power levels, and receiver sensitivity, operational factors such as distances between items and force structure, and frequency coordination all contribute to the EME. In addition, transient emissions and their associated rise and fall times such as from EMP, lightning, and p-static also contribute. (MIL-HDBK-237)

Electromagnetic Environmental Effects (E3) - E3 is the impact of the EME upon the operational capability of military forces, equipment, systems, and platforms. It encompasses all electromagnetic disciplines, including electromagnetic compatibility (EMC) / electromagnetic interference (EMI); electromagnetic vulnerability (EMV); electromagnetic pulse (EMP); electronic protection (EP); hazards of electromagnetic radiation to personnel (HERP), military munitions--ordnance (HERO), and volatile materials such as fuel (HERF); and the natural phenomena effects of lightning and precipitation static (p-static). (MIL-HDBK-240)

Electromagnetic Radiation (EMR) - Radiation made up of oscillating electric and magnetic fields and propagated with the speed of light. Includes gamma radiation, X-rays, ultraviolet, visible, and infrared radiation, and radar and radio waves. (JP 1-02, DoD Dictionary)

Emission Control (EMCON) - The selective and controlled use of electromagnetic, acoustic, or other emitters to optimize command and control capabilities while minimizing, for operations security: a. detection by enemy sensors; b. mutual interference among friendly systems; and/or c. enemy interference with the ability to execute a military deception plan. (JP 1-02, DoD Dictionary)

18. AP2. APPENDIX 2, EQUATIONS USED: Replaced EQN C9.T13-7, -8, -10, -11, -19, -20, -22, and -23 with the following:

$$\text{NEWQD} = \exp[-30.833 + (307.465 + 260.417 * (\ln(d_{\text{IBD,PTRD}})))^{1/2}] \quad [\text{EQN C9.T13-7}]$$

$$\text{NEWQD} = \exp[7.395 + (-124.002 + 24.716 * (\ln(d_{\text{IBD,PTRD}})))^{1/2}] \quad [\text{EQN C9.T13-8}]$$

$$\text{NEWQD} = \exp[-31.628 + (617.102 + 260.417 * (\ln(d_{\text{IBD,PTRD}})))^{1/2}] \quad [\text{EQN C9.T13-10}]$$

$$\text{NEWQD} = \exp[6.604 + (-94.642 + 24.716 * (\ln(d_{\text{IBD,PTRD}})))^{1/2}] \quad [\text{EQN C9.T13-11}]$$

$$\text{NEWQD} = \exp[-39.744 + (930.257 + 319.49 * (\ln(d_{\text{IMD,ILD}})))^{1/2}] \quad [\text{EQN C9.T13-19}]$$

$$\text{NEWQD} = \exp[3.834 + (-181.58 + 45.249 * (\ln(d_{\text{IMD,ILD}})))^{1/2}] \quad [\text{EQN C9.T13-20}]$$

$$\text{NEWQD} = \exp[-40.527 + (1309.19 + 319.49 * (\ln(d_{\text{IMD,ILD}})))^{1/2}] \quad [\text{EQN C9.T13-22}]$$

$$\text{NEWQD} = \exp[3.045 + (-127.817 + 45.249 * (\ln(d_{\text{IMD,ILD}})))^{1/2}] \quad [\text{EQN C9.T13-23}]$$

Revision 3, 1 September 2003:

1. Revised Cover Page header and footer to reflect DDESB-KT Memorandum of 26 August 2003 announcing that only the "Rewrite" version of DoD 6055.9-STD approved by DoD Explosives Safety Board at its 325th Meeting, 11 December, 2003, will be maintained.
2. Added page numbers to "Table of Contents" and "Figures and Tables".
3. Revised header and footer of all pages to reflect Rev 3, 1 Sep 2003.
4. C2.2.1.3, 5th sentence and C2.2.1.5.5, last sentence: Changed "2.5" to "2.52" to reflect the correct conversion factor.
5. Revised C2.2.5.1, C2.2.5.2, C2.2.5.3, C2.2.5.4, C2.2.5.5, C2.2.5.6, and C2.2.5.7 headings to reflect change 4 above.
6. C3.4.1, 4th sentence: Revised "8,820 lbs" to "8,818 lbs" to make the conversion consistent with other parts of the STD (i.e. C10.4.1.2.2.)
7. C4.3.1.3: Revised "9.6" to "9.52" to be consistent throughout the STD.
8. C5.2.2.2: Corrected kg value for 250,000 lbs from "113,630" to "113,398".
9. Revised equations EQN C5.2-4, EQN C5.2-6, EQN C5.2-8, EQN C5.2-10, and EQN C5.2-14 to reflect change 4 above.
10. Table C5.T2 Equations. Corrected numbering problem with equation numbers assigned to C5.T2.
11. C9.4.1.1.2.1.6.1: Revised "8,820 lbs" to "8,818 lbs" to make the conversion consistent with other parts of the STD (i.e. C10.4.1.2.2 and C3.4.1.)
12. Table C9.T2:
 - a. Modified Table C9.T2 entry for ≤ 31 (≤ 14.1) to eliminate confusion and expanded Notes (3) and (4) to address the NEWQD region that the above entry was directed to.
 - b. Revised Notes (3) and (4) of Table C9.T2 to reflect NEWQD, as shown on Table C9.T2, and not MCE, which was incorrect.
 - c. Revised Note (5) to reflect that equations in Notes (1) through (4) could be used for determining other allowable HFD-NEWQD combinations.
13. Table C9.T4, EQN C9.T4-4, Changed NEW to NEWQD.
14. Table C9.T10: Revised ILD entry for 70 lbs MCE to 200 feet, the minimum ILD required per Note 1.

15. Added Note (c) under General Comments to C9.T11 to assist Services in finding the authorization for storage of limited quantities of HD 1.2.2 for operational necessity. Paragraph C9.4.2.10 permits this storage.
16. EQN C9.7-11: Revised " $W^{0.4}$ " to " $W^{0.41}$ " to correct an error. Corrected this error in AP2 as well.
17. C9.8.4.3.4.2: Revised this paragraph as discussed in DDESB-KT Memorandum of 28 August 2003, Subject: Correction of Error in "Rewrite" Version of DoD 6055.9-STD as Pertaining to Explosives Ordnance Disposal (EOD) Proficiency Range Barricading. An error had occurred in conversion of the STD to the "rewrite" version with respect to the need for a barricade at an EOD Proficiency Training Range that provided a 500-foot protection distance to exposed sites requiring IBD, PTR, or ILD. The above Memorandum corrected this error.
18. AP2: Corrected equation numbers to match change made in Chapter 5, Table C5.T2 (see Change 10 above.)
19. AP2: Revised equations C9.T2-10, C9.T2-11, C9.T2-12, and C9.T4-4 to change "MCE" or "NEW" to "NEWQD".

Revision 2, 1 July 2003:

1. C5.3.2.4.3: "width" changed to "length" in two places to make the terminology consistent with C5.3.2.3.
2. C5.3.3.3 was deleted since criteria for minimum barricade length are specified in C5.3.2.3.3.
3. C5.3.5.2.1: Callout for C3.3.2 changed to C3.2.3, which is the correct paragraph.
4. C5.3.5.4.1: Callout for C5.F2 changed to C5.F3.
5. C5.6.10 added per DDESB-KT Memorandum of 9 June 2003, subject: Board Approval for Demilitarization Processing Equipment and Operations for Expended .50-Caliber and Smaller Cartridge Casings by Correspondence Vote.
6. C2.2.1.5.6 added. HPM-related information was inadvertently left out during the Rewrite effort.
7. For clarification, converted the scientific notation "e" used in some of the formulas in Table C9.T4 to " $\times 10$ " (ie., $4.5e-03$ to 4.5×10^{-3}). Both represent the same meaning.
8. Corrected equation C9.T4-8: " $-1.002764+06*d$ " was changed to $-1.002764 \times 10^6*d$.
9. C9.8.19 added per DDESB-KT Memorandum of 9 June 2003, subject: Board Approval for Demilitarization Processing Equipment and Operations for Expended .50-Caliber and Smaller Cartridge Casings by Correspondence Vote.